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U. S. DEPARTMENT OF AGRICULTURE.

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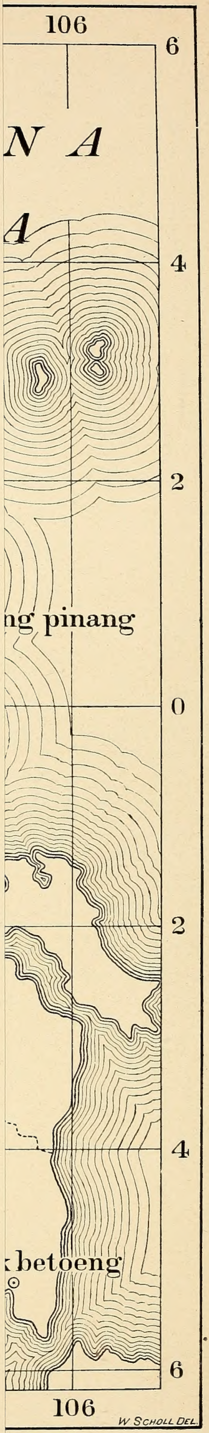
CULTIVATION OF TOBACCO IN SUMATRA.

BY

EMILE MULDER.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1898.



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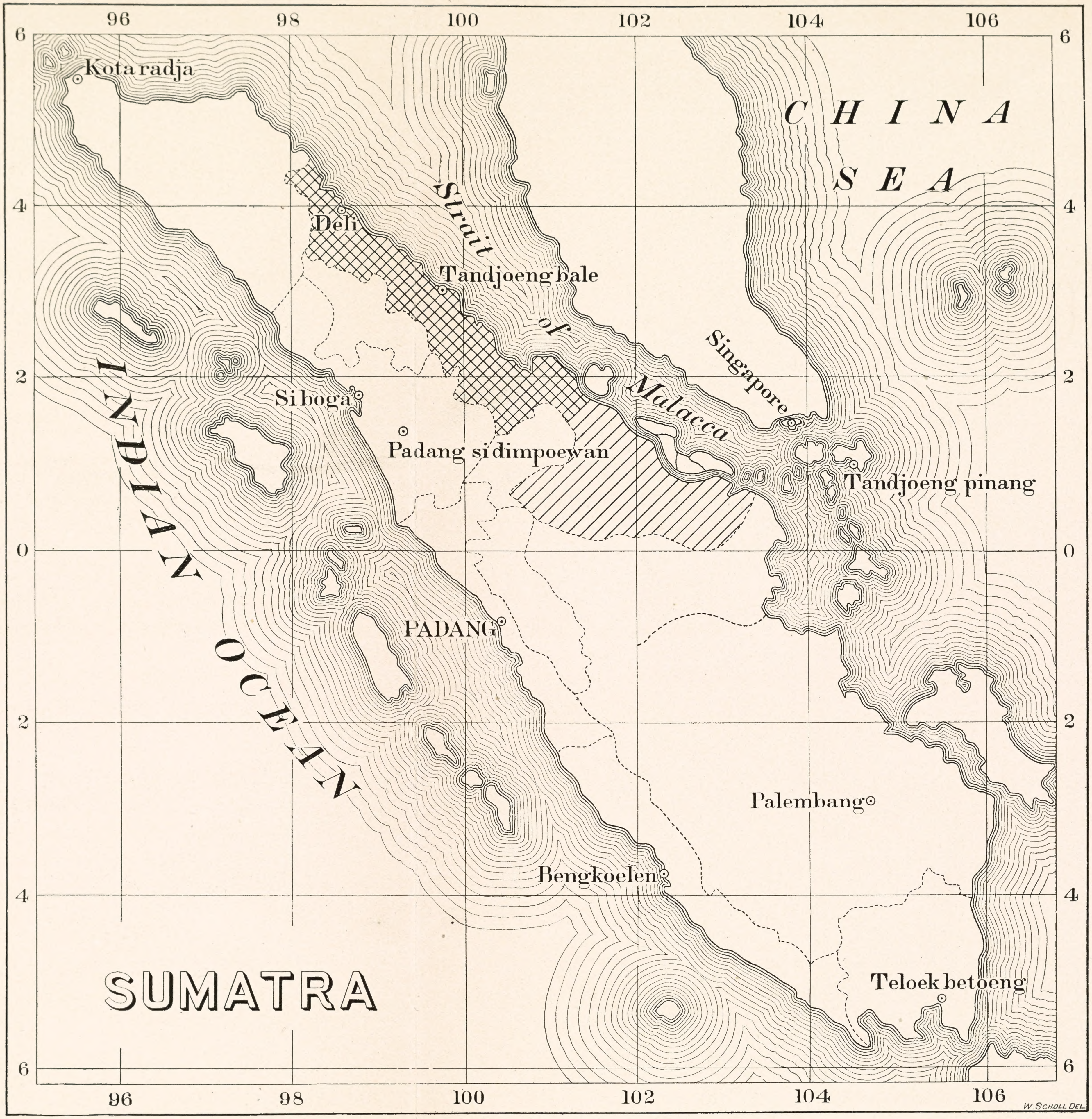

MAP OF THE ISLAND OF SUMATRA.

The heavily shaded portion shows the older tobacco area of the east coast, and the light shaded area shows the new portion where the cultivation of tobacco has not as yet been very successful.

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF SOILS,
Washington, D. C., March 18, 1898.

SIR: I have the honor to transmit herewith a paper upon the method of cultivation and statistics of the tobacco crop of Sumatra and the physical features of the tobacco district, prepared at your request by Mr. Emile Mulder, of Starke, Florida.

Mr. Mulder is a son of the late associate justice of the supreme court of the Netherlands' East Indian colonies. He lived for many years in the East and opened and managed for a number of years a tobacco plantation on the east coast of Sumatra.

There is so much interest taken in the growing of cigar tobaccos in this country at present and so much competition from both Sumatra and Cuba, that it seems important to lay before our tobacco growers all the information possible in regard to the conditions and methods of production in the countries from which the competition is most severely felt. Sumatra tobacco competes particularly with the product from the Connecticut Valley, Pennsylvania, Wisconsin, and Florida. Florida and the Connecticut Valley produce a wrapper more nearly like the Sumatra than any other places in this country, yet on account of the very fine texture and the very thorough grading of the imported Sumatra leaf it brings readily from $2.50 to $5 per pound in our markets against 25 to 50 cents per pound for the very best grades of our Connecticut Valley leaf. The reason for this difference in price is partly fashion, as the Sumatra leaf makes a fine smooth wrapper, which looks well in a case; partly economy, as a pound will cover four or five times as many cigars as a pound of domestic wrapper and there is very little waste. Furthermore it is so well assorted as to length, color, and shade, that small manufacturers can maintain a particular brand with a small amount of wrapper leaf to select from, while with the domestic leaf the color so lacks uniformity in the case, that it is necessary to have a considerable stock on hand in order to maintain a uniform brand of cigars.

It is very desirable that our people be as fully informed as possible in regard to the conditions and methods which produce this tobacco, which seems to be desired by the present market demands. It is hoped that some of the descriptions will suggest valuable modifications and improvements in our present methods of growing and handling the crop.

Respectfully,

MILTON WHITNEY,
Chief of Division.

HON. JAMES WILSON,
Secretary of Agriculture.

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CULTIVATION OF TOBACCO IN SUMATRA.

PHYSICAL FEATURES OF THE ISLAND.

Sumatra forms part of the Dutch East Indies, colonies of the Kingdom of the Netherlands (Holland), and is one of the four great Sunda Islands. The other three of the large islands of the group are Java, Borneo, and Celebes. This group of islands is situated in the remote southeastern part of the continent of Asia. (See frontispiece.)

The island of Sumatra is about 1,000 miles long and 266 miles wide in its widest part. The total area of the island is about 168,000 square miles. The famous tobacco region known as the East Coast of Sumatra covers only about 15,000 square miles. This district is almost directly under the equator. It is a province under the government of an officer called a resident.

A feature of this island is made by the Barisan Mountains, which run through its entire length. In the southwest some of the peaks in this chain have an altitude of 1,500 feet, while near the equator they are as high as 6,000 feet. About twenty of the peaks are volcanoes.

Another range of mountains runs parallel with the Barisan chain, and elevated plateaus connect them at certain points. There are also extensive valleys. There are several lakes in the island, the largest of which is Lake Semaway, 17 miles long and 6 miles wide, in Upper Padang. This lake is 1,170 feet above sea level, and discharges its waters into the Indragiri, which flows northeast.

Many large rivers traverse the island. On the east coast the most important ones are the Djambi, Indragiri, and the Siak rivers. Most of the rivers run approximately from south to north. In the tobacco districts, therefore, the northern estates are usually called the lower and the southern ones the higher or upper estates. The rivers are usually sluggish and form extensive deltas, from which wide, alluvial plains have been developed, at present covered with jungle and forest, except where these have been removed for the purpose of cultivation.

The whole tobacco area of the East Coast of Sumatra is frequently called Deli, because this is the principal district and produces the best and finest tobacco.

The population of the East Coast of Sumatra consists of about 1,480 Europeans, 223,600 natives, 7,600 Chinamen, 290 Arabians, and about 5,000 other people from various parts of the Indies, including British

India. The Europeans can be subdivided into about 200 government employees, 300 soldiers of the Netherlands Government, 150 persons in mercantile business, the remainder, about 800, being planters.

CLIMATIC CONDITIONS.

Sumatra, being immediately under the equator and in the path of the general oceanic currents, has a truly tropical climate. This is characterized by having a very uniform temperature and an enormous rainfall. The seasons are called monsoons; the east monsoon lasting from April to October, and the west monsoon from October to April. The following tables give the meteorological conditions of only two stations, Penang and Singapore, of the Straits Settlements, but they furnish an idea of the conditions on the East Coast of Sumatra. There is in addition a table of the average rainfall in Medan, the capital of the East Coast of Sumatra, for a period of thirteen years.

TEMPERATURE AND RAINFALL.

Penang, Straits Settlements, latitude 5° N., longitude 101° E.

MEAN MAXIMUM TEMPERATURE.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1885	91.0	92.1	92.5	92.1	89.8	88.9	88.0	87.5	86.9	87.2	87.6	88.4
1886	89.7	91.3	93.7	91.7	89.7	88.8	88.9	87.5	86.5	87.0	87.0	86.8
1887	89.7	88.3	89.5	88.0	88.5	87.5	87.9	85.2	87.3	86.7	85.4	86.7
Mean	90.1	90.6	91.9	90.6	89.3	88.4	88.3	86.7	86.9	87.0	86.7	87.3

MEAN MINIMUM TEMPERATURE.

	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1885	73.0	74.0	75.4	76.7	76.2	76.2	74.9	74.4	74.7	74.4	74.6	74.2
1886	74.6	73.7	75.8	76.4	76.4	75.5	75.2	74.5	74.4	74.2	74.3	72.9
1887	73.8	74.2	73.5	74.0	75.0	74.0	73.7	73.8	74.4	74.3	74.0	73.6
Mean	73.8	74.0	74.9	75.7	75.9	75.2	74.6	74.2	74.5	74.3	74.3	73.6

MEAN MONTHLY TEMPERATURE.

	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1885	82.8	84.0	85.1	85.4	83.8	82.8	82.7	81.4	81.2	80.8	81.0	81.4
1886	82.5	83.1	85.2	84.7	83.5	82.8	82.6	81.5	80.5	81.0	80.3	80.4
1887	81.6	81.3	82.1	82.3	82.2	81.6	81.5	79.6	81.6	80.4	79.6	79.9
Mean	82.3	82.8	84.1	84.1	83.2	82.4	82.3	80.8	81.1	80.7	80.3	80.6

MEAN RELATIVE HUMIDITY.

	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1884	70	72	67	64	81	78	81	80	82	81	83	75
1885	69	66	69	72	77	78	77	80	81	83	83	77
1886	74	70	67	73	77	77	77	79	81	79	80	73
1887	75	76	74	78	78	77	75	81	78	81	81	78
Mean	72	71	69	72	78	78	74	80	81	81	82	76

TEMPERATURE AND RAINFALL—continued.

Penang, Straits Settlements, latitude 5° N., longitude 101° E.—Continued.

INCHES OF RAINFALL.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1882	7.39	1.50	3.46	4.12	17.78	5.21	7.64	16.53	9.84	35.09	8.55	9.19	96.30
1883	2.76	1.35	10.99	6.70	9.83	5.83	5.86	6.78	18.16	8.16	17.82	2.93	97.17
1884	3.62	2.87	.39	6.76	10.23	3.16	6.83	11.60	19.76	11.66	8.62	2.00	87.50
1885	.27	1.44	1.92	2.72	6.87	9.47	11.11	14.29	21.67	21.14	7.95	8.30	107.15
1886	5.73	2.16	.32	5.04	11.53	7.38	2.66	15.17	31.52	12.98	7.49	2.38	104.36
1887	7.70	6.47	5.71	8.77	14.76	7.17	16.03	23.39	11.98	23.15	13.16	9.36	147.65
Mean	4.58	2.63	3.80	5.68	11.83	6.37	8.36	14.63	18.82	18.61	10.60	5.69	111.60

NUMBER OF RAINY DAYS.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1885	3	5	3	8	14	13	11	12	19	25	24	15	152
1886	13	4	......	......	......	13	......	20	......	......	22	8	......
1887	17	16	15	20	18	12	12	16	16	24	25	18	209
Mean	11	8	9	14	16	13	12	16	18	25	24	14	......

Singapore, Straits Settlements, latitude 1° 27′ N., longitude 103° 51′ E.

MEAN MAXIMUM TEMPERATURE.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1881	85.1	88.7	86.5	89.0	88.4	90.0	85.6	88.4	90.6	90.6	87.3	86.7
1882	86.7	85.6	89.0	88.7	89.1	89.6	89.4	88.4	86.9	86.8	86.1	85.5
1883	85.5	86.9	87.7	87.3	88.0	87.3	87.0	87.4	86.4	86.0	84.9	84.8
1884	84.5	86.5	86.9	87.2	88.8	85.7	86.7	87.2	86.4	85.9	86.5	83.3
1885	86.0	86.2	87.7	88.5	88.2	86.8	87.3	87.6	88.0	88.6	87.1	85.1
1886	86.6	87.0	89.2	88.9	87.5	87.5	87.5	85.6	86.4	87.4	86.0	84.4
1887	84.5	84.4	85.7	87.0	87.6	86.4	87.8	85.1	86.8	86.4	84.8	84.0
Mean	85.6	86.5	87.5	88.1	88.3	87.6	87.3	87.1	87.4	87.4	86.1	84.8

MEAN MINIMUM TEMPERATURE.

	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1881	71.7	71.9	72.8	74.0	73.7	74.3	74.2	73.4	73.5	73.4	73.4	73.5
1882	72.5	72.5	73.2	73.5	73.2	73.3	74.5	73.3	73.2	72.5	72.6	71.6
1883	70.5	70.8	72.1	73.0	73.7	73.2	72.5	72.9	72.2	72.6	72.2	70.7
1884	70.7	70.2	71.1	71.9	73.1	72.4	72.7	72.9	71.8	72.1	72.4	70.3
1885	69.4	69.9	70.9	72.8	73.5	74.3	73.9	72.2	72.8	72.9	72.7	72.2
1886	71.8	71.4	72.3	73.4	73.4	73.0	73.9	72.9	73.5	73.5	72.5	71.6
1887	70.9	70.8	71.7	72.9	73.9	72.8	74.5	73.1	73.6	72.8	72.9	71.7
Mean	71.1	71.1	72.0	73.1	72.1	73.3	73.7	73.0	72.9	72.8	72.7	71.7

MEAN MONTHLY TEMPERATURE.

	Deg.	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*	*Deg.*
1881	78.4	80.3	79.6	81.5	81.0	82.1	79.9	80.9	82.1	82.0	80.4	80.1
1882	79.6	79.9	81.1	82.1	84.1	83.7	83.7	81.7	81.2	82.0	80.8	80.5
1883	79.4	80.4	81.4	82.1	82.9	82.2	83.1	83.0	81.5	80.5	80.2	79.0
1884	78.3	80.7	81.0	81.9	82.8	81.7	82.6	82.7	81.7	80.8	81.1	77.9
1885	80.0	79.2	81.5	82.4	82.7	82.3	83.0	82.9	82.3	83.0	81.4	79.8
1886	80.7	80.9	82.4	82.5	82.3	82.9	82.6	81.2	81.8	81.9	80.4	78.6
1887	79.1	78.5	80.3	81.8	82.1	81.0	83.3	80.6	82.1	81.2	79.8	78.7
Mean	79.4	80.0	81.0	82.0	82.6	82.3	82.6	81.9	81.8	81.6	80.6	79.2

TEMPERATURE AND RAINFALL—continued.

Singapore, Straits Settlements, latitude 1° 27′ N., longitude 103° 51′ E.—Continued.

MEAN RELATIVE HUMIDITY.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1882	......	......	......	80	76	76	74	76	79	78	82	84
1883	78	76	79	82	80	81	77	76	81	82	83	83
1884	84	79	80	81	80	83	78	78	79	83	82	83
1885	77	84	77	80	80	80	76	76	76	76	83	85
1886	82	76	79	81	83	81	81	82	82	81	84	82
1887	84	86	83	83	82	84	76	81	82	81	85	87
Mean	81	80	80	81	80	81	77	78	80	80	83	84

INCHES OF RAINFALL.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1881	13.49	1.91	8.30	6.14	8.70	2.65	5.01	5.40	5.48	10.41	11.23	12.23	90.95
1882	6.37	10.76	1.62	6.58	6.63	5.49	5.30	5.04	5.74	9.82	8.11	8.46	79.92
1883	2.95	2.39	6.30	7.87	7.62	4.83	2.71	3.10	9.38	7.41	6.03	6.15	66.74
1884	11.52	2.19	9.19	2.52	4.77	5.83	8.00	4.98	8.39	9.00	3.59	12.53	82.51
1885	1.99	6.29	1.17	5.40	7.22	10.11	3.82	2.34	2.81	3.96	10.42	15.48	71.01
1886	9.60	3.79	3.49	5.71	9.74	8.51	1.71	16.28	5.84	9.15	9.43	7.28	80.53
1887	11.79	12.90	5.46	9.12	7.12	10.23	13.97	14.39	8.53	6.92	10.28	12.98	123.69
Mean	8.24	5.75	5.08	6.19	7.40	6.81	5.79	7.36	6.60	8.10	8.44	10.73	86.49

NUMBER OF RAINY DAYS.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1881	14	6	18	9	7	8	12	7	8	15	18	18	140
1882	18	18	6	11	9	9	7	12	11	19	14	18	152
1883	5	6	10	13	11	9	10	13	16	18	21	20	152
1884	19	10	14	8	13	14	12	11	14	14	13	12	154
1885	6	14	5	9	20	14	9	8	13	8	20	18	144
1886	14	11	......	......	......	......	......	19	......	......	22	16	......
1887	23	21	21	19	18	18	10	19	16	16	20	24	225
Mean	14	12	12	12	13	12	10	13	13	15	18	18	......

Average rainfall at Medan for a period of thirteen years.

	Inches.		Inches.
January	5.1	August	9.0
February	3.6	September	10.1
March	3.6	October	9.4
April	4.9	November	10.2
May	8.1	December	8.7
June	4.7		
July	5.2	Total	83.1

As a rule the temperature increases slightly from October to March. The daily temperature ranges from about 70° F., at sunrise, to 94° at midday and is quite uniform throughout the season. Rain falls in all months of the year, but the greater portion of it falls between October and December, which constitutes the rainy season of the year.

SOILS.

The soils of the tobacco districts are mainly volcanic in origin. Those of Deli and Langkat, where is grown the finest and silkiest tobacco, of a rich brown color, are inclined to be argillaceous. The lighter colors of tobacco are produced on the loamy and sandy soils with a clay subsoil. Toward the southeast part of the district, where some of the newer tobacco estates have been opened, the soil is quite sandy, with a porous subsoil where a drought of one week often causes a serious loss. On the argillaceous soils of Deli and Langkat the tobacco can often stand a drought of three weeks or longer without much injury. In this district, however, they have frequent light showers which are of great value to the tobacco.

The Deli district slopes from the mountain to the east and, including Langkat, extends from 5 to 45 miles inland from the ocean. Experience has shown that land situated within 5 or 10 miles of the ocean does not produce as good a quality of tobacco as that grown farther inland. Where it is grown too near a large body of water it has a poor "burn." At the same time, the estates high up on the mountains have not had much success in growing a fine, silky wrapper. As a rule the lowlands, free from inundations and not too near the sea, have always given better results than the upper estates near the mountains.

A number of soils from the principal tobacco districts of Sumatra have been sent to the Division of Soils by the vice-consul at Padang. The mechanical analyses, showing the texture of these soils, are given in the accompanying table, followed by a brief description:

Mechanical analyses of tobacco soils from Sumatra.

No.	Districts.	Moisture in air-dry sample.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.01 mm.	Fine silt, 0.01 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
2207	Langkat	10.30	17.09	2.87	11.10	18.90	13.25	2.48	23.34	1.11	0.42
2202	....do	7.61	26.49	.76	1.23	5.26	16.87	18.29	16.89	3.58	1.00
2200	Deli	12.25	23.41	.81	1.44	3.62	13.94	19.52	18.82	4.69	2.72
2209	Langkat	7.89	20.39	2.13	8.64	15.46	20.50	13.59	8.84	1.25	3.98
2199	Deli	3.77	12.88	2.41	10.56	15 51	16.59	14.81	13.93	4.01	5.20
2210	Langkat	7.79	7.86	3.35	7.77	20.11	11.71	14.17	17.56	4.57	5.75
2208	....do	7.85	9.30	1.24	4.36	10.63	14.25	7.69	33.60	5.02	6.20
2195	Deli	3.07	9.95	.10	.30	2.86	19.91	32.91	15.98	5.94	7.20
2196	....do	3.06	8.82	....	.30	2.73	18.76	28.74	17.81	8.65	12.75
2201	Langkat	3.43	7.81	1.35	1.89	6.47	18.71	24.63	15.74	6.74	13.82
2197	Deli	3.97	13.26	.98	2.90	5.95	9.45	14.95	12.67	12.58	25.47
2198	....do	4.33	12.66	1.50	2.79	3.95	7.68	8.91	16.14	13.25	27.42

2207. This sample is from the Padang Brahrang estate of the United Langkat Plantations Company, Limited, in the district of Langkat. It is described as being adapted to a very good type of tobacco.

2202. This sample is from the Tandjong Goenoeng estate of the British Deli and Langkat Company, Limited. The description of this soil calls it a clay mixed with sand and indicates that it is very well adapted to tobacco; also to rice.

2200. This is from the Rimboen estate of the British Deli and Langkat Company, Limited. It is described as sand and clay and well adapted to tobacco.

2209. Sample from Tjermin estate of the United Langkat Plantations Company, Limited. It is said to produce a very fine leafy tobacco of good burning qualities.

2199. This is a sample from the Rimboen estate of the British Deli and Langkat Company, Limited, which for some reason is not well adapted to the production of tobacco. The plants have only eight or ten leaves and these are of third and fourth lengths. The reason for the inferior quality of the tobacco is not stated.

2210. This is from the Tjermin estate above mentioned, and is not well adapted to tobacco, as the subsoil is coarse and open and lacks humus and vegetable matter.

2208. This is from the Brahang estate above mentioned, and is said to produce a very fine wrapper leaf and to be adopted also to coffee.

2195. This sample is from the Bekala estate of the Deli Maatschappij. The soil is loamy and easily cultivated, and produces the very best kind of Sumatra tobacco imported into America, known as the "bull-eye speckled" tobacco. The sample is from a depth of from 4 to 12 inches.

2196. This sample is from the same place as the one just given. It is the subsoil at a depth of from 12 to 24 inches.

2201. This is from the Tandjong Goenoeng estate above mentioned. The subsoil is said to be volcanic and to contain much pumice stone. It is quite open and leachy and crops suffer from drought. For this reason it is not well adapted to tobacco, as plants die or are forced to early maturity before they have attained any size.

2197. This sample is from the Bekala estate above mentioned. The soil is rather heavy, containing a comparatively large amount of clay, and it is said there is no hardpan underlying this, and plants are liable to die about two weeks after being set out. For this reason it is not well adapted to tobacco growing. The depth of this sample is from 4 to 12 inches.

2198. This is a subsoil from a depth of from 12 to 24 inches, taken immediately under the sample just described.

THE INTRODUCTION OF TOBACCO.

Prior to 1862 a very good quality of tobacco was produced in the eastern portion of the Island of Java, in the same group of islands with Sumatra. This had been exceedingly profitable for the planters, but about this time the crops began to bring lower prices and planters were forced to look to other localities in which a better grade of tobacco could be produced. An Arabian trader called the attention of some of his merchant friends in Batavia, the capital of Java, to Deli on the east coast of the Island of Sumatra where he claimed there was a splendid opportunity to raise a particularly fine grade of tobacco. Little was known of Deli at this time, especially of the interior. After a persistent effort the Arabian succeeded in interesting a Java planter, Mr. Nienhuis, and in March, 1863, the latter accompanied the Arab to Deli to see what could be done in the matter. Mr. Nienhuis was received very cordially by the native sultan and succeeded in getting a firm foothold in Deli and securing several valuable franchises from the sultan. The following year Mr. Nienhuis was provided with sufficient funds by a mercantile firm of Rotterdam, and raised a crop of 50 bales of tobacco of about 176 English pounds to the bale. In 1865 he raised 189 bales. The first crop raised by Mr. Nienhuis in 1864 of 50 bales sold for 48 cents Dutch money, equivalent to about 20 cents American money, per 1.1 English pounds. The next crop (1865) of 189 bales sold for 149 cents Dutch money, or 60 cents American money, per 1.1 pounds. The 1868 crop of 890 bales sold at about 90½ cents American money.

The superior quality of this tobacco attracted the attention of experts to such an extent that in 1869 a number of capitalists of Amsterdam, headed by Mr. Cremer, concluded to undertake the raising of tobacco on a large scale. They organized the "Deli Maatschappij" ("maatschappij" means company) with an original capital of 300,000 guilders (about $120,000). Many companies and several private planters followed this lead, but the Deli Maatschappij has always been the most important organization of the east coast of Sumatra. At present there are 36 incorporated companies, with a total of 97 estates or plantations, and 38 private planters in the tobacco district of the east coast of Sumatra.

An estate to be at all profitable should contain at least 4,000 bouws, equivalent to about 7,000 acres. The land for such an estate is obtained in Sumatra in a way unknown in America. It is not bought outright, but a franchise or concession is obtained from the sultan for a period of seventy-five years under the sanction of the government. In the beginning of the tobacco industry a concession could be obtained for almost nothing. It depended mainly upon the native sultan, subject to the approval of the Netherland East India government, which was readily obtained. In recent years, however, it costs much more to obtain a concession, and so much of the best tobacco land has been taken up in Deli that it is difficult now to obtain the necessary quantity of land where good tobacco can surely be grown.

LAYING OUT AN ESTATE.

After the concession is obtained from the sultan and is approved by the government, the planter pays an annual rental, called hassill tanah, of 50 cents a bouw[1] per year. In the beginning the sultans were not very particular in the measurement of the land. The land was not accurately surveyed, and the boundaries were very carelessly given, so that usually much more land was obtained than had been asked for. In later years, however, this has changed, and now where a franchise is obtained the land is supposed to be accurately measured by a competent surveyor.

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[1] A bouw equals 7,097 square meters, equal to about 1¾ acres.

Only a portion of the 7,000 acres constituting an average-sized estate is under cultivation at any one time. When land was plentiful and concessions were easily obtained, the field was cleared and planted in tobacco but once in twelve or fifteen years, in order that the jungle should grow on it again and make it almost virgin soil. But since all the best land is now taken, this time is considerably lessened, and it is usual to allow but four or five years to elapse between successive plantings of the same field.

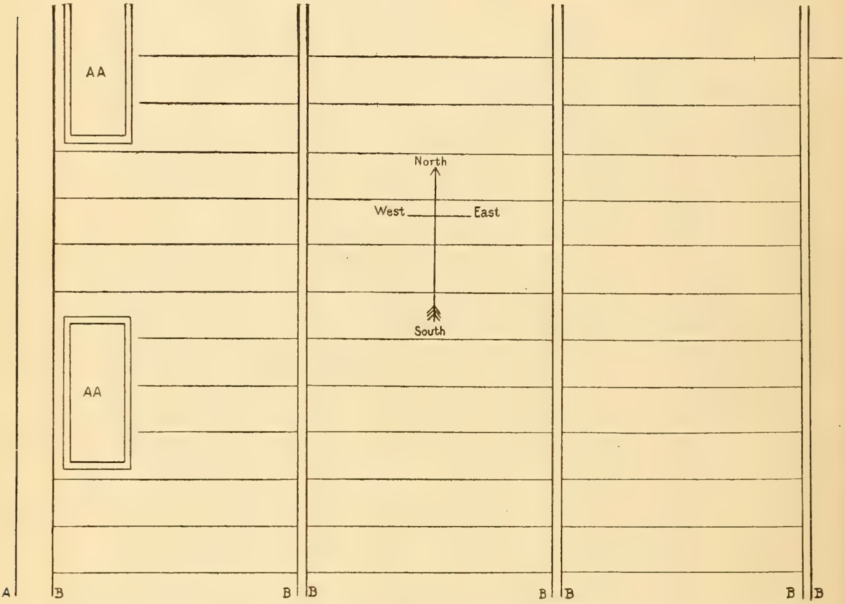

FIG 1.—Diagram showing arrangement of fields and sheds on Sumatra plantation. A B is the main plant road; AA, sheds; BB, small roads crossing fields parallel to main plant roads. The fields are each 60 feet wide from north to south and 960 feet long from east to west.

The estate is divided into a number of fields under a manager, or administrator, as he is there called. The maximum number of fields for an estate is about 400. The size of a field is usually 1⅓ acres, and this is given to one Chinese coolie to cultivate.

The arrangement of the fields is shown by fig. 1. The fields are each 60 feet front on the plant road by 960 feet deep and are divided from each other by small gutters to carry off the rain. Near the plant road are the sheds to receive the tobacco when cut. The plant road is 24 feet wide. Two roads, each 4 feet wide, run across the fields parallel to the plant road, dividing the fields into three sections. A cleared strip about 60 feet wide is left at each end of the tract to insure sunlight to the plants.

On a new estate the administrator usually commences with from 80 to 100 fields; occasionally an estate is started with 60 fields, but never with less. The second year 200 fields will be under cultivation, the third year 300, the fourth year about 350, while about the fifth year the full number of 400 fields will be reached. With this maximum number of 400 fields the administrator has enough ground to keep exchanging in order to let the land, after having been planted in tobacco for one year, lie idle, for a few years at any rate, to recuperate. This is considered an imperative necessity in Sumatra in order to maintain a superior quality of wrapper leaf.

INITIAL EXPENDITURES.

One of the most striking facts about the cultivation of tobacco in Sumatra, and a fact which will seem astonishing to the American planter, is the magnitude of the operations and the large amount of capital invested in the enterprise. The following list gives the principal items of permanent expense in obtaining a concession of 1,000 bouws, suitable for 200 fields, and for the equipment of the same with buildings, implements, and laborers.[1]

Traveling expenses, presents to native princes, surveying land, etc	$1,800
Clearing land for drainage, bridges, etc	400
Drainage, ditches, etc	1,200
Construction of main plant road	800
Manager's house	400
Two assistants' house	400
House for Chinese coolies	160
House for Javanese and Boyan coolies	120
Hospital, store, tool house, etc	160
Fermenting shed	640
Ox carts, 6 at $40 each, and 6 pair of oxen at $60 each	600
Horses, harness, carriage, etc	400
Expense of getting 60 laborers from Java	800
Expense of getting 250 Chinese coolies	2,400
Incidental expenses	1,600
Total	14,880

These are average prices, be it said, for an estate situated about 5 miles from the ocean. For places farther inland the expense of transportation will make the cost somewhat greater. The item for clearing the land is not the cost of clearing the fields, but simply for roads and ditches. The money paid for preliminary traveling expenses and presents to native princes is, of course, sunk; also the expense of getting the coolies.

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[1] The values in this bulletin, with the exception of the tables in the Appendix, are in United States money, based upon figures of some years ago, when the Mexican dollar was worth 80 cents and the guilder was worth 40 cents. On April 1, 1898, the Mexican dollar was worth only 44 cents.—M. W.

ANNUAL EXPENSES.

The average annual expenses of such an estate may be stated approximately as follows:

Salary of manager, at $200 per month	$2,400
Traveling expenses	200
Clearing land for 200 fields	800
Medical attendance, including medicine	480
Salary of 2 assistants, at $80 per month each	1,920
Chinese head overseer	240
Chinese or Singapore native clerk	144
Salaries of 60 Javanese coolies for one year	3,450
Watchman for one year	280
Rental to sultan	200
Government taxes	320
Twenty-five drying sheds, one for every eight fields, at $320[1]	8,000
Presses, scales, thermometers, etc	680
Pay of Chinese coolies, upon the supposition that each has an average, with sucker crop, of 15,000 plants, at an average price of $4.40 per thousand	13,200
Commission of Chinese foreman, 7 per cent of what his coolies have cut	924
Matting	80
Cost of fermenting, grading, sorting, baling, and hauling	5,600
Freight to steamer	80
Export duty of 1 guilder (40 cents) per bale	480
Total	39,478
Total cost at end of first year	54,358

BUILDINGS AND THEIR LOCATION.

In opening up an estate it is very desirable to have the buildings near the center, as the fields are constantly changing, and all of the tobacco has to be hauled to the curing shed. It is quite necessary, however, if there is a river running through the estate, that the establishment be situated near the river landing or upon the main road leading to the river landing, or to the railroad station. Great attention is given to the construction of the main plant road, which usually goes through the center of the estate, so that the fields will be distributed on either side. There should be a depth of at least 1,000 feet of land which can be cleared for the fields on either side of the road. The road is substantially built and thoroughly well drained, with ditches on either side. These ditches are from 3 to 6 feet wide, and about 2½ feet deep. Such a road usually costs from $24 to $32 per 600 feet.

The establishment includes a house for the manager, which, in the beginning, is a plain cottage, lifted from 6 to 9 feet above the ground, for the manager and one assistant. Later a better house is built. Chinese coolies, with the exception of the tandil, or foreman, are always single men. Sheds are usually built for them about 18 by 36 feet, one shed being intended for ten men. There is a small separate building of about 25 feet square for the head tandil; then there is a general kitchen, consisting of a shed about 16 or 18 feet wide and 160 feet long, where every coolie cooks for himself, excepting in sorting time. Their food is then prepared for them in bulk by the storekeeper.

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[1] These sheds need not be built anew every year. They last two to three years.

The Javanese coolie has a somewhat different house, as a great many of these are married men. They have small houses, about 25 feet square for the married men, while for the single men the houses are similar to those of the Chinese coolies.

There is a store on the estate under the control of a Chinese merchant, who usually pays for the expense of the building and who sells to the coolies at prices subject to the approval of the administrator. As the estate grows, branch stores are established in the several divisions of the plantation under the control of this merchant. When there are many Javanese coolies there is a separate store in the Javanese quarters, as the Javanese coolie is a Mohammedan and is not allowed to even touch anything coming from the pig, while this is the principal diet of the Chinese coolie.

The material shed is a building about 28 by 60 feet, and is usually covered with zinc or galvanized iron. This building contains the material and the extra attap or covering of the drying sheds. The building is usually insured for six or nine months each year. The horse stable, ox stable, and carriage sheds are all small open sheds, as the climate is so very warm that no closed stables are necessary.

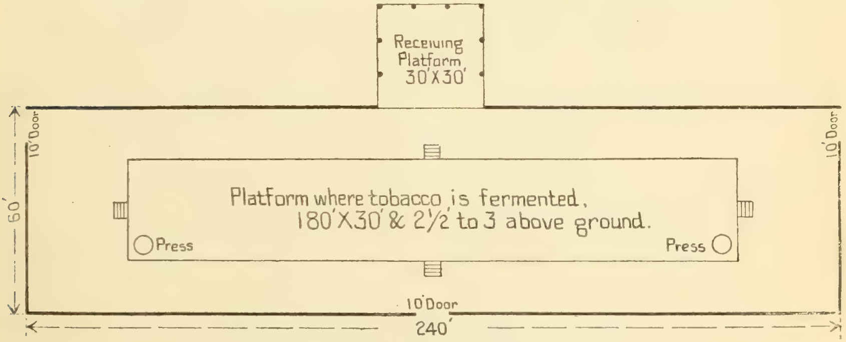
Receiving Platform 30'X30'
10' Door
10' Door
60'
Platform where tobacco is fermented. 180'X30' & 2½ to 3 above ground.
Press
Press
10' Door
240'

FIG. 2.—Ground plan of fermenting shed.

One of the important features of the Sumatra tobacco estate is the hospital. All of the laborers employed on the estate, including the Chinese and Javanese coolies, have to be treated free of charge by the planters in case of sickness. This is in all contracts for labor. At first the hospital is in a small building, but on some of the large estates, especially those of the older companies, fine modern hospitals have been erected, where all necessary medicines and appliances are kept, and where a regular physician comes at least once a week to visit and inspect the place.

The most important building of the establishment is the fermenting shed, which usually costs about $600 or $700. The ground plan of this shed is shown in fig. 2. It is usually about 240 feet long by 60 feet wide, not counting the two porticos at the doors on either side. It is 36 feet high and slopes gradually on either side to 10 feet in height. The whole length on both sides is filled with glass windows, so as to give plenty of light. There is a platform in the middle about 180 feet long and 30 feet wide. This is for the piles of tobacco in the fermentation. The platform stands on pillars 3 feet high, for the double purpose of having it freed from the moisture of the ground and to afford a good view over the whole fermentation shed. The platform is divided in the middle so that the coolies do not have to walk all around it in delivering the sorted tobacco. Some of these fermentation sheds are quite expensive, being made of brick and covered with attap, a sort of thatch, which will be described later.

On either side of the platform there is a space of about 15 feet which is kept free for the coolies who are sorting the tobacco according to the grades. While engaged in this sorting they sit on matting spread on the floor and have the benefit of the full light falling from the outside through the glass windows. The shed is usually built from east to west, so that the rays of the sun from December to February, the period when the sorting is usually done in Deli, will not fall on the side where the coolies are sorting.

There is an extension, marked "receiving place" on the plan, usually about 30 feet square and so constructed that plenty of light comes in over the top. This is where the tobacco is received from the drying sheds. There is a ditch 3½ to 4 feet wide and 2 feet deep around the shed to insure perfect drainage.

CHINESE COOLIES AND THEIR MANAGEMENT.

The Chinese coolie is an absolute necessity for the planter in Deli. It is doubtful if a laborer could be found that would serve all the purposes as well, taking into consideration the climatic conditions. He is admirably adapted to the work and understands what is expected of him. Europeans could not possibly stand what the Chinaman stands with impunity. The coolie is usually imported direct from China and at a very great expense, so that usually a number of planters club together and send one or two men to China to engage and bring over the coolies for them all. These coolies are called "singkehs," equivalent to our word "greenhorns." They know nothing about the cultivation of tobacco, and have to learn it from the Chinamen who have already been in Deli for a year or more.

The Chinaman does not plant and cultivate the tobacco on regular wages, but at so much per 1,000 plants grown. Later in the season, however, he does piecework in the fermenting shed. Each receives in the first place a few dollars down, usually $4, upon signing the contract. Then there is an advance of from $4 to $8 each, according to his appearance. This is advanced before anything is done by the coolie, in order to give him some capital to live on. The money so advanced is charged to the account of each individual, and is paid back when the tobacco is brought in. All the rest of the expense of getting the coolie over to the island and any bonus he receives is not returned directly to the planter. The Chinese coolie is bound to sell the tobacco to the estate. The manager gives him a field of land, about 1⅓ acres, after it has been cleared of the larger trees. He then gives him the necessary implements for clearing and cultivating the land, the actual cost of which is charged up to his account. Further, on every pay day, that is, on the 1st and 16th of the month, he gets from $1.60 to $2 advance, according to his standing. This is charged to his account. There is no Sunday in Deli. These pay days are called by the coolies "haribesaar," or great day. On these days they are not expected to work in the field, but are paid off about 11 o'clock in the morning and have the day to themselves. The Europeans are paid by the month.

The Chinamen from Singapore or Penang, who have been one or more years away from China, and those who have worked one or more years on the tobacco plantations and have been able to pay their debts and reengage themselves for another year, are, of course, considered the most desirable coolies to have. They speak a little of the native language—Malay—and often a little English. It is almost necessary to have a few of them on an estate to teach those who come from China direct. They know exactly what is to be done and how to do it, and they understand, moreover, that it is to their own interest to work well. There is one serious drawback, however, that they are inclined to be a rowdy set. They are inclined to think that they know more than they do and that they have more rights than others, and they very often cause great trouble on some of the estates.

PREPARATION OF THE GROUND BY COOLIES.

Clearing the land of the largest trees usually costs about $4 for each field. This is charged to the account of the coolie, but never more than this sum is charged against him. When the coolie arrives, a field is assigned to him from which the largest trees have been felled some time before, so that they are well dried out and fit to be burned. The Chinaman then gathers up the brush and wood and chops up the trees and burns the land off until the growth is entirely reduced to ashes. Sometimes very large trees are left lying on the ground and the planting is done around them, as also around the stumps. No plows are used, except in very rare cases. It would be impossible to make any progress with a plow on land so full of stumps and roots and pieces of trees as these newly cleared jungle fields are. Occasionally in grass land a plow, drawn by two or more buffaloes, is used. The coolie is supplied with an implement called "tjankol," with which to work the ground to a depth of 12 inches. This takes the place of the plow in this country. He must, of course, very often use his ax to cut the roots, which are then exposed to the sun, and when dry are burned.

Where possible, the fields adjoin the main plant road and are laid off about 60 feet wide with a depth of 960 feet, where the ground is level. Taking off the places for the sheds, roads, and ditches, this gives about 1⅓ acres for actual cultivation. Between every two fields there is a small ditch, which runs entirely around it, to show the dividing line and to drain the land. The 960 feet depth of the fields is then divided, after it has been cleared, into three parts, by ditches which run into the main ditch on the side of the plant road. The system of drainage is very perfectly maintained. There is also a narrow road of 3 or 4 feet in width running between the three parts of the field. The growth is cleared for about 60 feet beyond the limit of the field, in order to admit the light and sunshine to the lower parts of the field.

SUPERINTENDENCE OF THE COOLIES.

About every 40 men have a foreman, called "tandil." He is a Chinaman who has had a few years' experience and has been promoted from the ranks of the coolies. This man receives usually 7 per cent of what his division of coolies gets and is entitled on pay day to $4, to be charged against his account. The head tandil is the head foreman of all the Chinamen on the estate. He is usually a civilized Chinaman who has been a coolie, then a tandil, and who has consequently had all the experience which it is necessary to have. His position on the estate is one of great importance, and many a row and difficulty between the coolies and the European assistants could not be fixed up without his assistance. His income depends upon circumstances, but is always more than any of the assistants, and is sometimes as much as the manager receives. He does not get as large a stated salary as the manager, but he has several perquisites, including the concession of the gambling tables on great days, which, altogether, means a large sum. The working hours when the coolies are expected to be in the field are from 6 a. m. to 11 a. m., then there is a rest from 11 a. m. to 1 p. m., then in the field again from 1 p. m. to 6 p. m., making ten hours a day. In working in the fermenting sheds the hours are the same, excepting that the noon rest is shortened one hour and the day ends an hour earlier, as there would not be light enough after 5 o'clock to do the sorting.

A very complete system of espionage is maintained over the coolie by the planters. They frequently run away to escape payment of their debts, or for some crime that has been committed in the frequent affrays that take place. There is an agreement between some of the planters that a coolie shall always be given a letter of discharge when he leaves a place honorably, and they will never engage a coolie outside of China or Singapore unless he is provided with a proper letter of discharge. This letter contains the name and a full description of the person. Nevertheless, there is a large traffic in these letters, and they often sell for $10 or $15 apiece. If a person is caught using a discharge letter not intended for him, the letter is confiscated and the coolie is sent to jail. No coolie is allowed to leave the estate during the year and visit another estate, or go to a neighboring city without first getting a written pass. The color of the pass is pink, while the discharge letter is a light green. A pass is usually issued for from one to ten days. Whenever a coolie is met on the public highway by a police official his pass is demanded, and if it is not shown he is confined in jail until the police can find out from what estate he has come. A reward is offered of $2 or $3 to the guard who returns the person, and this amount is charged up to the coolie himself. Notwithstanding the strictest precautions, there are many who run away in Sumatra and are never brought back. Any manager belonging to the planters' committee engaging a coolie without a proper discharge letter is liable to a heavy fine from the committee.

THE DRYING SHEDS.

There is generally one drying shed (fig. 3) for eight fields. These sheds are usually 72 feet wide by 180 feet long and 36 feet from the ground to the ridgepole. The sheds are placed, if possible, near the main road of the estate, and are nearly always built from north to south, to protect them from the heavy winds which frequently prevail in Deli. The material for the construction of these sheds comes almost entirely from the jungle, with the exception of the covering for the roof and sides. There are seven rows of posts. The row in the center has posts 36 feet high; one row on each side has posts 28 feet high, and on each side of this there is a row of posts 20 feet high, and on either side again a row 12 feet high. In each row there are 31 posts. They are commonly sunk 4 feet in the ground. The building of the sheds is frequently given out by contract to Malays. Sometimes the material is all furnished by the contractor and at other times by the estate.

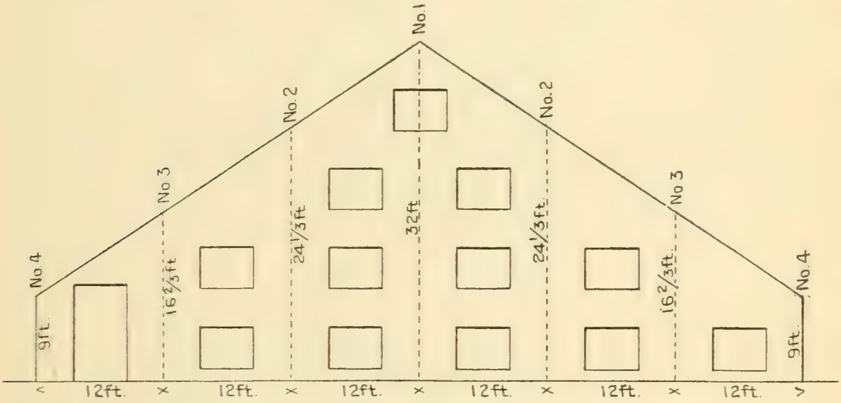

FIG. 3.—Front elevation of drying shed, windows 4 by 5 feet; door 9 feet high.

These sheds are only expected to last for two years, after which time they are abandoned and new ones built in other fields that have been taken up. They are therefore not very substantially put together. They are not covered with planks, but with rough wood from the jungle. The roof is covered with attap. This is made of a sort of palm called nipa-palm. The leaves of the palm are bent around a bamboo about 6 feet long. The width of the whole when finished is about 1½ feet, so that a surface of about 9 square feet can be covered with each bundle. These are attached to the laths on the roof by rattan strings in such a way that each attap covers the next one by about 5 inches, in order to prevent leakage. This makes a very substantial and durable covering for the purpose for which it is intended. When the shed is abandoned this attap is removed and stored away until needed for another shed. It shrinks somewhat on drying, and when it is put on a new building it must be crowded somewhat closer. The doors and windows are made to give very thorough ventilation when open. The doors are small, as carts are never drawn into the shed, the tobacco all being brought in by hand.

The supports on which the tobacco is hung are usually set at the following distances: The first one is 5½ to 6 feet from the ground, the next one is 2½ feet higher, while the next four usually have a distance between them of 5 feet. Of the six compartments into which the shed is divided lengthwise by the rows of posts only five are used for hanging up tobacco; the sixth one—that is the one on the end of which are the two doors—is not used to hang tobacco, as there would be danger of damage by the coolies bringing in the fresh tobacco. There is a small platform called the "lantih," about 12 feet square, upon which the tobacco is stripped from the stem when it is cured.

PLANTING AND CULTIVATING.

As a rule, each coolie makes and keeps his own plant bed in the front part of the field near the road. Occasionally a fine piece of land is picked out where all the beds are made together, but in this case every coolie has his own bed. The usual size of the beds for each coolie is about 3 by 18 feet, or 54 square feet, upon which is put rather less than half of a cartridge-shell measure of seed. As it is difficult to give a definite measure of the seed required on account of the change in its vitality and the change in seasons, a number of trial beds are usually sown, so that the manager can know what is the best measure of seed to sow. It is important that the beds be not too thickly sown. The bed is about 1 foot high with a ditch all around it. The seed is kept by the manager in quart bottles, and this seed bottle is never given to the Chinaman. Each coolie gets a paper package with enough seed for one bed at a time. He mixes the seed well with dry wood ashes, about 2 or 3 quarts of ashes for each bed. After the bed has been thoroughly prepared, cleared of all roots and carefully raked over and well watered, the mixture of ashes and seed is carefully spread over the surface. Every six days a new seed bed is made, in order to be sure to always have fresh plants of proper size on hand when the time comes for transplanting. A bed of this size will produce about 2,000 good plants as a rule. As a coolie plants about 10,000 plants on an average in his field, it would be expected that he would make about 5 of these seed beds, but as a rule every coolie makes from 14 to 16, and sometimes as many as 20 seed beds.

When new land is used it is not necessary to burn the beds first, as little trouble will ensue from grass and weeds; but if old land is used it is necessary to burn the land over, as is done in the United States.

Before sowing the seed bed is covered with a sort of roof. On one side of the bed sticks are put in about 3½ to 4 feet high, and on the opposite side sticks of from 3 to 3½ feet, thus giving a gentle slope to the roof, which is made of straw or prairie grass. This can be put close together or spread out as desired, in order to regulate the amount of heat received by the small plants. In this way the seeds and tender plants are protected from the intense heat of the East India sun. Beds are always made from east to west lengthwise. After eight or ten days the roof can be spread out considerably in the morning and evening, and after a month or five weeks it can be taken off and kept to serve for another bed. The plants are usually ready to be transplanted in from forty-five to fifty days after the seeds are sown.

The white ants and occasionally caterpillars and worms are very destructive in the seed beds. The best way to get rid of the pests is by taking them off by hand. For this purpose the Chinaman goes over the bed very early in the morning or in the evening with a torch. Sometimes a mixture of water and *akar toeba* (root of a plant called toeba) is applied with good success to keep off the pests.

SETTING OUT THE PLANTS.

Transplanting begins about the last of March and is continued until the beginning of June. Experience has shown that after that date the results are not so satisfactory.

The field is first thoroughly broken up to a depth of a foot with the tjankol. The coolie then carefully clears the piece which he intends to plant of all stumps, grass, etc., and rakes the ground carefully, so that it has a smooth and even appearance. This is done the day before the transplanting. The coolie is then provided with a plant string of the same length as the width of the field, namely, about 60 feet. Each end of the string is securely attached to a stick 3 feet long for the purpose of laying off the rows. The string itself is divided into spaces of 2 feet by securely tying red or blue ribbon or cord at these intervals. These show where the plants are to go in the row. The coolie then provides himself with a plant stick about 5 feet long and sharpened at each end. The middle of the stick is flattened somewhat that it may be held more securely. After stretching the plant string across the field the holes are made with the stick about 4 inches deep and 3 inches wide. In this way about 250 or 300 holes are prepared in rows 3 feet apart, the holes in each row being 2 feet apart. The holes are watered immediately before the plants are put in.

Early the next morning after these holes are made the coolie pulls out about 300 of the best plants from his plant bed. Those which are fresh looking and which have a healthy green color are, of course, selected. The pulling is done when the dew is on the plant. The bed is first wet thoroughly with water and the plants are then pulled out carefully, so as not to injure the roots. A little earth is left on the roots. The plants are put upright in a basket in such a way as to support each other. They are usually from 3 to 6 inches long at the time of pulling. When the required number has been pulled the tops are sprinkled with water and the basket is covered with a piece of cloth. The basket is then taken to the coolie's lodging, where it remains until 4 o'clock in the afternoon. After pulling the plants the plant beds are again watered and the loose dirt is carefully packed again. When the seed bed begins to look yellow and the plants get old and sickly it is abandoned and raked over. By this time another bed, which was planted six days later, will be ready, and thus the coolie has a constant supply to keep him at work until his field is planted.

About 4 o'clock in the afternoon, when the rays of the sun are not very strong, the coolie takes the basket and drops a plant near every hole. When all are dropped he commences to plant. He holds the plant in the middle of the hole with his left hand and with his right hand presses the dirt around the roots carefully but firmly, so that he can give the plant a slight pull without removing it.

SHADING THE YOUNG PLANTS.

If there is time, the same evening, or otherwise early the next morning, the coolie commences to put in the shade planks. These are in the shape of a shingle, are made of very thin, light wood about 7 or 8 inches long and about 5 inches high. They cost from $8 to $9 per 10,000. Each coolie supplies himself with about 3,500 of these planks, which are added to his account, but if he desires to do so he can return them after use and get credit for what he returns.

The planks are put in slanting over the young plants in such a way that the opening goes to the east. This shuts out the noonday heat, and lets the sun shine on the plants only early in the morning. As the plants grow the planks are straightened up. If the plants grow well and nothing happens to them, and especially if the weather is not too dry, the shade planks are taken away about twelve or fifteen days after transplanting. When taken away the soil is scraped up against the stem of the plant to protect it from the hot rays of the sun.

The process herein described of setting out 300 plants is repeated and continued from the new seed beds, which come on until the last one of the 10,000 plants has been set out in the field of about 1⅓ acres.

PUNISHMENT FOR CHEATING.

The coolie often attempts to plant short, as it is called—that is, to plant less than 2 by 3 feet—in order to get a larger number of plants on the field. It is the duty of the European assistant to enforce the rule of planting very rigidly, and sometimes the coolie is compelled to pull out his plants and replant them the next day. Many disturbances arise over this question and serious quarrels are the consequence. When the short planting is discovered by the European assistant the next day after it is done it is a good lesson for the coolie, and he is not apt to plant short again: but after a few days have passed and the plants are growing it is rather hard to have to pull them out and reset the plants pulled out.

STIRRING THE SOIL AND WATERING.

The cultivation of the crop is never done as in this country by plows or cultivators, but is all done by hand with the tjankol. The field is usually cultivated three times during the season. The first time the plants are about 9 inches high. The coolie places himself between two rows of plants and makes a little gutter in the middle, about the width of his tjankol, which is about 8 inches wide. He takes dirt and loose earth up with this instrument and puts it against the plant, evenly divided on each side. It is absolutely necessary to make this quite level, as the plants under no circumstances must be allowed to stand in a hole where the water could accumulate. This first cultivation leaves a small gutter between the rows about 4 inches deep, which also serves the purpose of allowing the rain water to run off to the outside ditches. Before planting the coolie goes around and carefully clears out the ditches around the field so that they may be prepared to perfectly and rapidly carry off the heavy rains which can still be expected. While cultivating his crop he does the same thing and uses the mud out of the ditches, after first drying it in the sun, to put against the plants. If the weather should be very dry for a few days immediately after planting, the coolie often has to water his young plants by hand. For this purpose and for watering his seed bed he uses clean water from a stream or well and not the dirty water from the ditch.

The heavy rains commence to fall sooner on the uplands—that is, those in the south part of the tobacco district—than in the lowlands, therefore the transplanting and cultivation begins sooner on the higher estates than on the others.

The second cultivation takes place when the plant is about 12 or 15 inches high. The little gutter in the middle of the row is made deeper and the soil which comes from it is again put against the plants, as in the first cultivation. Before doing so, however, the coolie takes off the leaves on the bottom of the plant to the height of about 3 inches and puts them around the stem and packs the soil on these. He is exceedingly careful in breaking these leaves to see that the broken end is covered up immediately, so as not to expose the injured parts to the sun. At this second cultivation the plants are carefully examined and all suckers are removed. These are broken off and buried around the stem of the plant in the same way as the leaves, so as to protect the stem.

The third and last cultivation takes place when the plants are about 2 feet high. The rows by this time stand in rather high ridges, so that they are well protected from the heavy rains.

DISEASES OF THE PLANTS.

The tobacco plants are subject to injury in a number of ways. Frequently a worm settles in the stem of a plant or in the stem of a leaf and feeds upon the plant until it becomes sickly. These sick plants are recognized by the appearance of the leaves, some of them becoming contracted. The only remedy is to pull up the plant and work the ground over. Sometimes the plants put in the ground in the same place are again troubled in the same way. The coolie, who does not wish to lose the plant, will often try to doctor it by cutting the stem open and taking the worm out, but the plant so treated will never amount to much and it is best to pull it up and destroy it.

Another injury causes the so-called gilas or corkscrew plants. The plant at a certain height suddenly becomes bent in a crooked way and the leaves are strangely curled. The only thing to be done in this case is to cut the stem off where the twist commences, but even this will not always remedy the fault, and then the plant has to be taken out.

There is also the "phesem" or "white-heart," which causes the tobacco to suddenly become very light in color. This frequently occurs after heavy rains. There are also so-called "lightning" plants, which have white specks and frequently a white appearance throughout. These also have to be thrown out. Frequently, also, the plants have rotten, empty stems and leaves that commence to die before the plants are half ripe.

Resetting to replace such losses is practiced during the time just after a rain and as soon as possible after the planting. This is the only chance for these plants to catch up with the main crop. If the resetting is done too late the small plants never amount to much.

FERTILIZERS.

Fertilizers are very seldom used in Deli, and never on new land. In the grass lands it is sometimes necessary to use fertilizers. In this case about 300 pounds of guano are used to a field after first mixing it with the same amount of wood ashes. It is applied either dry or in liquid form. When applied as a liquid it is well mixed with water, about one quart of the guano to an ordinary bucket of water. It is then applied to the young plants shortly before the shade planks are taken off, and it is only given to those plants which seem yellow and weak. In applying the liquid a small ditch is made about 2 inches wide around the plants and 1½ inches deep, and a quantity of the mixture poured in. After the mixture has soaked in, the ditch is covered with the soil that was taken out. It is very desirable to apply this mixture immediately before a rain. It is necessary for the European assistant to see that the coolie does this work properly and that the fertilizer is not applied too near the roots, as it is then liable to seriously injure the plant. When used dry the fertilizer is scattered broadcast at the time the field is planted. Besides guano, boenkil is frequently used in the same way. This is a fertilizer made in cakes, and consists mainly of cotton-seed meal. Horse and cow manure is also used to some extent, but the quantity available is not large enough to be of any particular account.

TOPPING AND RIPENING.

When the plant has been about forty or fifty days in the field the flower buds begin to come out and are pinched off, just as in the United States. The appearance and vitality of the plant determines how much shall be pinched off in the topping. It is usual to leave from 15 to 18 leaves, but in some extraordinary cases as many as 24 leaves are left on. After the plants are topped suckers come out in great quantities and the coolie has to keep them broken off. This is usually done in the morning.

If the topping has been done at the proper time the tobacco is usually ripe and fit to be cut about three weeks later. No definite and positive rule can be given which will indicate the ripening of the plant, and, in fact, there are various opinions upon this matter. The tobacco when ripe has a yellowish appearance, the leaves, especially the inside ones, have little light brown lumps and take on a somewhat swollen appearance, while the edges commence to curl up toward the underside and assume a dark brown color. The time from transplanting to harvesting in Deli is from 70 to 90 days.

WORMING.

One of the most important features of the work with tobacco in Deli is the worming. Here, as elsewhere, the plants are troubled a great deal with these pests. From the beginning of the planting until the tobacco goes into the barns or sheds the coolie has to look for worms. He usually does this early in the morning or at night when there is moonlight. No poisons are used, but the worms are caught by hand and killed. The coolie realizes that it is to his own interest to have the leaves free from worm holes, and rarely has to be urged to attend to this matter. Still, if some of them neglect it, and the appearance of the field shows it, they have to be set at it by those in charge.

SAVING SEED.

At the time of topping, a few plants are left for seed. The best, finest, and healthiest looking plants are selected for this purpose. These, of course, are not topped, but are allowed to grow and blossom at their full height. Some of the planters take off all the leaves when they grow large enough, but usually only those at the bottom are removed. If any of the plants that have been selected for seed show subsequent signs of sickness they are, of course, immediately topped and harvested when ripe. When ripe the little balls containing the seed are carefully cut off with a knife or scissors. The seed plants frequently grow as high as 10 feet, and it is necessary in gathering the seed to use a bench to stand on. The cutting must be done very carefully so that the seed shall not fall out. When gathered the balls are taken to an assistant's house and spread out on a large piece of linen or calico. They are then put out in a moderate sun, or, better, in a place where there is a warm current of air. When perfectly dry the seed is pressed out of the hull by hand and the hull thrown away. The seed is, of course, full of dirt and fragments of the hull which must be removed. After it has been thoroughly dried it is put through a sieve or strainer in the open air, by which process, and by blowing the seed as they fall, the dirt is removed as much as possible. The seed is again dried and is put through a small seed mill. As it comes slowly out from the mill a wheel is operated which blows away the lightest seed and chaff and allows only the heaviest and best seed to fall near the mill, where they are caught on sheets. The seed is divided into two grades, No. 1 and No. 2, according to the weight. There is little difference, but No. 1 is considered somewhat the better. The seed is then put up in quart bottles and well corked, or put in clean, empty 5-gallon oil cans and well covered with cloth. It is occasionally examined to see that no lumps form and that no worms attack it. About 300 plants are considered necessary for one quart bottle of good seed. The coolie is paid from $7.20 to $8 per thousand for the plants.

CUTTING AND HOUSING.

Formerly the entire stalk of tobacco was cut and brought to the drying shed by the coolie in a conveyance called "pekoelan," a rude sled. About forty-five or fifty plants can be placed upon this conveyance. The coolie cuts the plants off with a knife in a slanting way 6 inches above the ground, and puts them carefully in the pekoelan. When he has cut a load he takes it to the drying shed. As all the leaves never ripen on the plant at the same time, much green tobacco is in this way carried to the shed.

Recently the system of priming has been adopted. In this method, instead of cutting the whole stalk, the leaves are taken off from the stalk and carried to the drying shed in baskets. Some growers prime off half the leaves in this way and then cut the balance of the stalk. Tobacco is never cut or primed when wet with rain or dew, as this causes the leaves to sunburn and little holes to form, which lowers the value of the leaf. The cut tobacco is very carefully kept from the ground and the pekoelan is covered while being hauled from the field to the drying shed.

The contract with the coolie ends with the delivery of the tobacco to the drying shed and its acceptance by the European assistant. After the main crop of tobacco has been cut, the best of the suckers, which have come out in the last few days before cutting, are allowed to grow and mature. These suckers are usually topped at about ten or even eight leaves, and the coolie receives for them, commonly, about half the rate of the other tobacco. They receive about $3.20 per thousand plants for the very best suckers, although occasionally $4.80 is given, but not often. The very small sucker plants are not accepted at all, but are thrown away. These plants always have to be kept separate. After the sucker crop has been secured the stalks of the tobacco plants still in the ground are taken out, root and all, by the coolies before they leave the field and go to the fermenting shed. This is done to prevent the growth of additional sucker crops, which would exhaust the soil without doing any good. The stalks of tobacco, after being stripped in the drying shed, are scattered over the field intended for the next year's crop.

When the tobacco is hauled in by the coolie he is supposed to put ten plants on the stick, as already explained, in such a way that it can be readily examined by the European assistant. The tobacco is purchased of the coolie at the rate of $6.40 per 1,000 plants for the best, and about 80 cents per 1,000 plants for the worst tobacco he delivers. He is therefore required to put up plants of the same kind together on the same stick.

Each coolie has a small book in which is entered the tobacco delivered by him. The assistant also keeps a book for the same purpose, with the number of his field, and sends in a report regularly to the manager, so that proper credit can be given to the coolie for the tobacco delivered.

The assistant also keeps a book showing the quantity of tobacco in each of the drying sheds, and in case of fire this book is the basis of settlement with the insurance company. It is necessary to have the sheds insured, at least while the tobacco is in them, as fire not only occurs occasionally from external causes, but the native battaks frequently set the sheds on fire for imagined wrongs or to secure redress of real grievances.

HANGING AND CURING.

When the coolie arrives at the shed with a load of tobacco he is met by a helper who has prepared the tobacco slats and has hanging on each of them ten little strings with a loop in each. Matting is spread on the ground and the plants are put on it. A plant is then placed in every loop, and ten plants are thus put on every stick.

The tobacco which has been accepted as satisfactory is hung for one day on the lower supports and is then removed to the top of the shed and the shed is filled from the top down. Green tobacco must never be hung under tobacco which is already half cured. The smaller plants are put up in the top of the shed, so far as possible, and the larger ones under them. A shed of the dimensions given will contain from 45,000 to 50,000 plants. A watchman sleeps in every shed and takes care of the opening and closing of the doors and windows for ventilation under instructions from the European assistant.

Light colors are much in demand at the present time, and for that reason in clear and warm weather all the doors and windows of the shed are kept open in order to get all the light and air possible. As a rule the doors and windows are not opened until after 8.30 or 9 o'clock in the morning, as there is much dew and moisture in the air during the night and early morning. At first they are only opened a little, as the green tobacco must not yellow too quickly. With strong, heavy winds everything is kept tightly closed. This is a matter of experience, and no rules can be given for the ventilation of the barn.

As a rule, the tobacco is cured in from four to five weeks and is ready to be stripped and bundled.

Occasionally during continuous wet weather it is necessary to use fire in the shed. It is, of course, better not to do this, but if it is necessary the following rules are adhered to: In the first place a fire must never be used which gives any smoke, because the odor will settle in the tobacco and never leave it. In firing everything must be closed and only perfectly dry wood can be used. Two sticks are put together with the ends against each other and lighted. The tobacco immediately over the fire must be pushed aside, so as not to allow it to come too close. A hole is made about 3 feet square and about 1¼ feet deep, in order to get a good draft. The fire is started at sundown and put out about 9 o'clock on the following morning, when the windows can be opened. The fire is put out by pulling the sticks away from each other and covering with sand. Water is never used for this purpose, as it might injure the leaf. The one thing that is needed is the heat of the fire, and no smoke nor steam must be allowed.

STRIPPING AND BUNDLING.

The tobacco is stripped on a little platform about 12 feet square in the drying shed. The bottom and top leaves of the stalk are kept separate. These are again divided into ragged and those which have holes in them and those which are black and heavily speckled. These four kinds are put together in separate bundles of about 50 leaves each. They are tied with the same string with which the tobacco was hung up in the first place. This stripping is done early in the morning.

The bundles are brought to the fermenting shed in baskets. No care is taken to separate the leaves into lengths, except that in a general way there should not be too great a difference between the length of the leaves in the same bundle. The baskets for carrying the bundles are about 4 feet in diameter and about 2 feet high. They are lined with matting and have strong handles. They will hold about 225 or 250 bundles. Care must be taken in packing the baskets not to pack the bundles in too tightly, and they should not come above the edge of the basket. They are then covered with matting and sent on an ox cart to the fermenting shed, each cart carrying two baskets. The baskets are numbered and the weight of each is put on the outside in plain letters.

The contract with the coolie ends, as already stated, with the delivery of the tobacco at the drying shed; all the work which he does after that he is paid for separately. In some plantations the stripping and bundling is done by the coolies, and in many of them by the Javanese women and children. The payment for stripping and bundling is 1 doewit per bundle. A doewit is one thousandth part of a Mexican dollar. The actual doewit piece is no longer in use, but it remains a basis for calculations. The 10-cent piece is in use, representing 100 doewits. With the Mexican dollars worth 80 cents, as it was when I was living in Sumatra, the payment for 100 bundles would be about 8 cents, American money.

FERMENTING.

Very much of the value of the Sumatra tobacco is dependent upon the infinite care that is taken throughout the whole period of its production. The minute care and incessant vigilance of the Chinese coolie, acting under the supervision of the manager and the assistants who represent the companies, can hardly be conceived by an American. Nowhere, however, is this care and thorough consideration of details shown more clearly than in the fermenting and sorting and grading.

The tobacco comes direct from the drying sheds to the one fermenting shed, which holds all the tobacco of the estate. It does not leave here until packed and ready for shipment to the European markets.

The fermentation has two purposes. The first is to insure the proper texture, glossy appearance, and color to the leaf. It brings out the characteristic properties of a wrapper leaf, which are hardly apparent when the leaf is cut in the field. It is furthermore necessary to press the tobacco into bales so that it can be shipped in compact form.

Formerly, when dark colors for cigar wrappers were in much favor by the dealers and manufacturers, the tobacco was worked up to a very high heat in the fermenting pile; but since lighter colors are more sought for the fermentation has to be done more slowly and not to such a high degree of heat as formerly.

It is impossible in the space of this article to describe the process of fermentation in all its details. Experience and judgment enter into the matter so largely that only one who has had this experience can appreciate the changes which are going on in the pile, and can judge of the necessary and further treatment.

The tobacco is put into piles of three kinds, the "quality" or top leaves, bottom leaves, and ragged tobacco. The piles are built up on matting. One row is spread on the matting, the bundles being placed close together with the heads in the same direction. At the corners the leaves are spread out like a fan. In this way layer after layer is put on until the pile is from 4 to 6 feet high. When a large or rather a high pile is to be made, hollow bamboo rods are inserted in the middle of the pile, in which a thermometer is placed at the end of a stick. The outer end of the bamboo has a plug of cotton, so that the temperature of the outside can not interfere with that of the inside. With smaller piles, and especially with trash and inferior tobaccos, simply a bamboo stick is inserted in the pile without a thermometer. The manager, on touching the stick when it is withdrawn, judges how warm the pile is inside. In still smaller piles the hand is simply put in between the bundles. When the temperature rises to about 100° F. the pile is taken down, the tobacco is given a chance to cool off slightly, and a new pile is put up in another place. Care is taken that bundles from the interior are placed on the outside, to give those which were formerly on the outside an equal chance of fermenting. The temperature gradually goes higher until it finally attains the temperature of about 130° F., when the fermentation is stopped. This maximum temperature must not be attained too quickly, as the quality of the leaf would suffer. No statement can be made as to how often the piles should be turned over, or when this should be done, as it depends upon the condition of the tobacco, especially as to how moist it was when put into the pile.

The so-called fat or "quality" tobacco, made up of leaves from the second half of the stalk—that is, from top leaves—has to be treated differently from the drier bottom leaves of the plant. It can not stand as much heat as the latter and must be fermented much more slowly and gradually. It will have to be torn down and rebuilt more often than the dry tobacco in order to obtain the light colors which are desired. In making up a pile of the finest grades of tobacco the bottom layers and the top of the pile are usually made of broken and inferior tobaccos, as the fermentation does not take place as readily here as on the inside of the pile.

The principal fermentation is thus done before the sorting, as after the sorting there are so many different grades which have to be kept separate that it is impossible to make as large a pile with many of them as would be desirable. Occasionally, however, these grades are refermented in order to improve the quality of the leaf.

SORTING.

The ragged leaves are usually assorted first of all when the coolie first comes in from the field, as there is little else for him to do at that time. The sorters sit on matting near the windows on both sides of the fermenting shed. They have in front of them wooden pins stuck on the ground in the shape of a half circle. These are for the different kinds of tobacco. The tobacco is usually divided, with infinite care and judgment, into the following kinds: Brown, dark gray, light gray, yellow, multicolored, coarse not speckled, slightly speckled, dark and brown slightly speckled, gray and light speckled all colors, little-broken dark and brown, little-broken gray and light, much-broken all colors, sweepings, and trash. Some of the estates have other divisions, and some of the kinds here mentioned are again subdivided, but these are about the most important.

The experienced sorter opens the bundle which he gets from the stick in front of him and commences to divide it, independently of lengths, into different kinds. Two or more coolies, that work in partnership with him, but who are not experienced enough to do the sorting, take the leaves out of the compartments between the wooden pins, and lay them down in such a way that the leaves of the same length come together. These leaves of the same length are then made up into bundles of from 35 to 40 leaves in each bundle, bound together with a piece of string, usually made of the inner bark of a tree. These bundles are kept together until they are inspected and received by one of the assistants. The inspection is very thorough, both as to color and length of leaf, and any leaves which should not be in the bundle are taken out. The coolie is then credited in the bundle book and paid at the rate of about 3 doewits for each bundle. He therefore has to sort out about 333 bundles to make a Mexican dollar. This money is divided by the sorter between himself and his helpers as they mutually agree.

All of the different kinds of tobacco are now put into separate piles, each pile having its mark on a little label. After this, the bundles in each pile are carefully sorted by lengths, and each kind is separately divided into bundles having leaves of the same length to be baled together. As each bundle already contains only leaves of uniform length, all the coolie has to do is to measure the whole bundle, and then keep the four different lengths together. These lengths are as follows: (1) From 16 inches up to 20 inches; (2) from 12 to 16 inches; (3) from 9 to 12 inches; and (4) from 6 to 9 inches. Before the tobacco is sorted into lengths it is occasionally put through a second fermentation, and in this case the temperature occasionally runs up as high as 150° F., and even higher, but this is not advisable in the production of light-colored wrappers.

In sorting as to length the Sumatra planter is inclined to be very liberal; that is, when a bundle is just long enough to go for second length he will take no chances, and will rather put it with the third than run the risk of criticism from the European dealers. Also, if the tobacco is all packed and a little tobacco left of two or three of the different grades, which would make together one bale, the planter puts on that bale the mark of the most inferior of the kinds, so that the buyer gets the benefit of the doubt in all cases. This is one reason why the Sumatra tobacco commands such a good price, as the purchaser can be sure that the contents of the bale have been very carefully assorted, and that it always conforms to what is written upon the outside of it.

BALING.

After the bundles are assorted into lengths the tobacco is pressed into bales of 80 kilograms, equal to 160 Amsterdam pounds and to 176 English pounds. The trade-mark chosen for the estate is then put upon the outside of the matting which covers the bale, and marked to indicate the grade and length of tobacco. The bale is made in the following way: A wooden or iron receptacle, consisting of four loose sides without cover, is put under the press. It is about 2½ feet square and something over 2 feet high, and goes in on rollers. The four sides are taken off when it stands under the press. Matting is put on to the bottom in such a way that it projects out on either side. Then the four sides are put up and filled with tobacco which has previously been carefully weighed out in baskets. The filling of the box with tobacco has to be done by experienced hands, and great care is taken to spread the leaves out uniformly in the bundles. Care is especially taken to spread them out at the corners in such a way that it will make a nice package with square corners. When the proper weight of tobacco is put in the whole is covered with matting which has previously been labeled with the estate's especial marks. The press is applied until the package has a thickness of about one foot. The iron cover to the press fits in the box so that it goes down without touching the sides. It frequently takes as many as twenty able-bodied men to press the cover down and squeeze the bale into the proper dimensions. When in this condition, the sides are removed and the matting of the top and bottom is pulled together and sewed on the four sides, and iron pins are put in to keep it in position. When thus fastened the pressure is removed and the package is rolled out. The matting is then strongly sewed with stout twine, and then the iron pins which secured it temporarily are taken out. The bale is then marked as to its grade and length and is ready for shipping.

The coolies are paid 3 doewits per bale, making it necessary, in order to earn a Mexican dollar, to make 333 bales per day, which they never do. As a matter of fact, it takes from 16 to 20 men to put up 120 bales per day, and they consider that they have worked pretty hard in doing this. Most of the coolies are already at work in the fields for the next crop before the tobacco is all baled and ready to be shipped. Bales are transported either by river or railroad to the seaports where they are to be put on steamers and sent to Europe. Nearly all of it is sent to the Dutch markets, most of it going to Amsterdam.

PRICES AND PROFITS.

The statistics given in the tables in the appendix to this bulletin show something of the enormous profits which have been made by some of the companies. As a rule, the tobacco produced in Deli and Langkat brings the best prices of any from the east coast of Sumatra. For example, the Deli tobacco of the crop of 1893 brought an average price of approximately 64 cents per pound, American money; Langkat, 62 cents; Asahan, 35 cents; Serdang, 44 cents; Batoe Bahara, only 30 cents per English pound. The prices quoted in the tables are, of course, the average price of the whole crop, which consists of all grades and kinds of tobacco. In all crops some of the small and inferior tobacco brings only 5 or 6 cents per pound. With the 1892 crop some of the third length, measuring from 9 to 12 inches, was sold for as much as $1.55 per pound. Frequently the first-class wrapper leaf will sell for as much as $2.40 per pound, and finer grades for much more than this.

It will be seen from the tables that some of the companies have paid during their existence and are still paying enormous dividends. It is true that their quotations are high and the shares sell at a big premium, but even granting this the profits are enormous. The stock of the Maatschappij Arendsburg, which has paid the highest dividends of all during its existence, was quoted in 1895 at 730. It was then paying a dividend of 111, making even at that quotation an interest of more than 15 per cent on the investment, earning the original capital every year.

These dividends and the enormous profits made by some of the companies induced a great many people to go into the tobacco business, and company after company came into existence. Unfortunately, however, the best soil is limited to a small area, and most of this had been already taken up. The newcomers, therefore, took up land wherever it could be obtained, so long as it was on the east coast of Sumatra. Besides this, many people who knew little or nothing about tobacco commenced planting it, attracted by the dividends. The result could readily have been foreseen. They produced, indeed, Sumatra tobacco, but of such an inferior quality, of a bitter, oily taste, and with a poor "burn," that prices went down rapidly until, when the crop of 1890 was sold for 29 cents per pound, American money, the crash came. This crop was 50,000 bales larger than the crop of 1889. The cost of the production per pound of this tobacco is believed to be from 32 to 36 cents per English pound in American money, and as a consequence no dividends were declared at that time. It is true that there were other reasons which forced the price down. Among others, the United States had supplied itself abundantly the year before, in anticipation of the new tariff, and bought only 11,000 bales, where it had purchased 48,182 bales the year before, and where it purchased 32,926 bales the next year.

Several of the new companies had to go into liquidation immediately and many estates were closed. The average price of the next crop, although hampered by the inferior tobacco remaining in the hands of the Amsterdam importers, showed some improvement and went up to 34 cents per pound, American money. The average price for the 1892 crop rose to 45 cents, and for the next crop to 52 cents, after which it came down again to 33 cents for the 1895 crop.

It is clear from this that the market must not be overstocked, and in the second place that no inferior tobacco can be put upon the market without injuring the price of all grades. The returns show that the Sumatra tobacco imported into the United States must be of the very best quality, judging by the prices paid for it.

GROWING SUMATRA TOBACCO IN FLORIDA.

My experience in this country has convinced me that a very good type of Sumatra tobacco is being successfully raised in some of the counties of Florida. If this continues of the same good quality and is well and conscientiously prepared for the market, there is certainly a large market here in the United States for a great deal more than is at present produced. If it will take the place of the imported Sumatra the manufacturer will save an enormous amount in duty alone, and will probably be very willing to take the tobacco at a good price. It must not be forgotten, however, that one of the great values of the Sumatra tobacco, and the thing which contributes more than anything else to give it the great value placed upon it by the manufacturers, is the fine texture of the leaf, which can only be attained upon certain soils; other things worth mention are the uniform color, which is brought out in the fermentation; and the very great pains taken to assort it into grades of uniform color and length, so that a manufacturer may be assured in buying a bale that he secures just what is marked on it.

APPENDIX.

Production of Sumatra tobacco from 1864–1896.

[The yield is given in bales of about 80 kilos each (about 176 pounds) and the price is for one-half kilo in cents (Holland). One-half kilo = 1.1 pounds, and 100 cents (Holland) = 1 guilder = 40 cents of United States. The price noted is the average for the crop.]

Year.	Production.	Price, one-half kilo.	Total value of crop.	Year.	Production.	Price, one-half kilo.	Total value of crop.
	Bales.	*Cents.*	*Guilders.*		*Bales.*	*Cents.*	*Guilders.*
1864	50	48	4,000	1882	102,047	137½	21,500,000
1865	189	149	40,000	1883	93,532	134	19,150,000
1866	159	121	30,000	1884	125,496	144	27,550,000
1867	210	73	20,000	1885	124,911	141½	26,976,000
1868	890	142	200,000	1886	139,512	154	32,600,000
1869	1,381	129	250,000	1887	144,577	121	26,650,000
1870	3,114	122	500,000	1888	182,284	128½	35,500,000
1871	3,922	137	750,000	1889	184,322	146	40,600,000
1872	6,409	132	1,000,000	1890	236,323	72½	26,000,000
1873	9,238	182	2,500,000	1891	225,629	91½	31,400,000
1874	12,895	150	2,850,000	1892	144,689	126	26,700,000
1875	15,355	170	3,900,000	1893	169,526	144	37,600,000
1876	29,034	152	6,500,000	1894	193,334	119	35,000,000
1877	36,517	126	6,800,000	1895	204,647	90	28,350,000
1878	48,545	126	9,200,000	1896	191,185	111	32,400,000
1879	57,596	117	10,350,000				
1880	64,965	112½	11,250,000		2,834,839	119½	518,870,000
1881	82,356	115	14,750,000				

Sumatra tobacco imported into the United States.

Year.	Imports.	Total value, exclusive of duty.
	Bales.[1]	
1876	Sample lot.	$260.00
1877	Sample lot.	30.00
1878	....	....
1879	....	....
1880	752	87,807.00
1881	2,691	300,192.17
1882	6,780	780.016.55
1883	6,039	2,373,839.29
1884	10,810	1,684,694.13
1885	24,348	3,504,660.42
1886	22,243	3,245,826.77
1887	35,199	5,825,826.14
1888	15,321	3,827,980.30
1889	42,397	6,478,195.78
1890	48,182	8,251,929.42
1891	11,645	873,246.56
1892	32,926	4,573,702.06
1893	18,418	3,711,406.52
1894	35,022	7,517,029.19

[1] Bale = 80 kilos.

Financial statement of the principal tobacco companies.

Name of company.	Organized.	Capital.	Quotation at issue.	Dividends, 1886–1895.			Quotation, 1888–1895.	
				Number paid.	Lowest.	Highest.	Lowest.	Highest.
					Per ct.	*Per ct.*		
American Deli Co	1894	(?)	....	8	10	95	170	640
Amsterdam Deli Compagnie	1879	G 1, 000, 000	100	....	....	....	......	......
Amsterdam Sumatra Cultuur Maatschappij	1894	G 800, 000	....	....	....	....	......	......
Asahan Tabak Maatschappij	1889	G 800, 000	....	....	....	....	......	......
British Deli and Langkat Tobacco Co. (Limited)	1889	£320, 000	....	8	6	15	......	......
Deli Batavia Maatschappij	1875	G 1, 000, 000	100	8	10	62½	210	482
Deli Cultuur Maatschappij	1894	G 2, 000, 000	115	....	....	....	119	136
Deli Langkat Tabak Maatschappij	1886	G 1, 000, 000	100	5	8	25½	28	300
Deli Maatschappij	1869	G 8, 000, 000	100 200	9	29¾	109	334	860
Deli Tabak Maatschappij	1893	G 1, 350, 000	112	3	7½	8¾	91	133
Langkat Cultuur Maatschappij	1895	G 1, 200, 000	110	1	....	9	91½	104
Langkat Tabak Maatschappij	1894	G 2, 100, 000	105	1	....	4	69	105
Medan Tabak Maatschappij	1890	G 4, 000, 000	125 200	2	10	12½	125	196
Nederlandsche Asahan Tabak Maatschappij	1891	G 3, 500, 000	122	....	....	....	49	125
Padang Tabak Maatschappij	1895	G 600, 000	125	1	....	6	100	118
Paya Janbu Estates Co. (Limited)	1881	(?)	....	....	....	....	......	......
Ramoenia Cultuur Maatschappij	1896	G 750, 000	....	1	....	6	......	......
Rotterdam Deli Maatschappij	1888	G 1, 200, 000	100	2	11	12	73	160
Senembah Maatschappij	1889	G 1, 500, 000	200	5	6½	60	135	370
Serdang Tabak Maatschappij	1894	G 1, 700, 000	100	2	6	8½	91	108
Shanghai Sumatra Tobacco Co. (Limited)	1883	M $130, 000	....	(?)	(?)	(?)	......	......
Sumatra Cultuur Maatschappij	1892	G 1, 000, 000	....	1	....	6	......	......
Sumatra Tabak Gesellschaft "Tandjong Kassan"	1888	F 450, 000	....	2	10	19	......	......
Sumatra Tobacco Plantations Co. (Limited)	1888	£60, 000	....	2	10	19½	......	......
Tabak Maatschappij "Arendsburg"	1877	G 1, 000, 000	100	7	14	152	400	1, 020
Tabak Maatschappij "Franco Deli"	1895	G 3, 000, 000	110	....	....	....	70	107
Tabak Maatschappij Tjinta Radja	1892	F 800, 000	....	(?)	(?)	(?)	......	......
United Langkat Plantations Co. (Limited)	1889	£450, 000	....	5	8	30	......	......

G = guilder, or about 40 cents United States money.
£ = pound sterling, or about $4.86.
F = franc, or about 19 cents.
M $ = Mexican dollar, or about 44 cents United States money.

Crop statistics of the principal companies operating in 1896.

Name of company.	Number of estates.	District.	Total acreage.	Bales, 1896.	Prices, Dutch money.			
					1893.	1894.	1895.	1896.
					Cents.	*Cents.*	*Cents.*	*Cents.*
American Deli Co	1	Padang	(?)	917	......	......	47	73
Amsterdam Deli Compagnie.	5	Deli	10, 100	8, 191	201	165	100	133
Amsterdam Sumatra Cultuur Maatschappij.	3	Padang and Bedagei	8, 080	2, 407	......	......	75	81
Asahan Tabak Maatschappij.	1	Bilah	5, 000	....	70	32	Failed.	
British Deli and Langkat Tobacco Co. (Limited).	5	Deli and Langkat	10, 600	6, 726	112	111	78	110
Deli Batavia Maatschappij	5	Deli	11, 000	9, 906	148	152	101	115
Deli Cultuur Maatschappij	5	Deli	5, 800	7, 325	109	79	92	106
Deli Langkat Tabak Maatschappij.	1	Deli	2, 400	2, 218	162	125	97	141
Deli Maatschappij	21	Deli and Langkat	82, 400	45, 811	156	124	100	125
Deli Tabak Maatschappij	2	Bedagei	8, 000	3, 139	92	76	71	77
Langkat Cultuur Maatschappij.	1	Langkat	4, 500	2, 008	146	146	74	95
Langkat Tabak Maatschappij.	3	Langkat	4, 200	4, 224	135	107	114	144

Crop statistics of the principal companies operating in 1896—Continued.

Name of company.	Number of estates.	District.	Total acreage.	Bales, 1896.	Prices, Dutch money.			
					1893.	1894.	1895.	1896.
					Cents.	*Cents.*	*Cents.*	*Cents.*
Medan Tabak Maatschappij	2	Deli and Langkat.....	10,477	3,342	133	120	93	135
Nederlandsche Asahan Tabak Maatschappij.	6	Asahan...............	28,500	6,372	92	91	59	111
Padang Tabak Maatschappij.	1	Padang...............	5,000	1,773	......	126	94	97
Paya Jambu Estates Co. (Limited).	1	Langkat..............	2,800	1,185	123	164	83	139
Ramoenia Cultuur Maatschappij.	2	Serdang and Deli.....	3,300	1,997	......	......	93	105
Rotterdam Deli Maatschappij.	4	Deli and Padang......	6,100	5,162	121	104	76	71
Senembah Maatschappij...	6	Serdang and Deli.....	47,836	12,645	136	101	106	122
Serdang Tabak Maatschappij.	3	Serdang..............	19,450	2,244	88	87	77	104
Shanghai Sumatra Tobacco Co. (Limited).	1	Langkat..............	1,500	3,008	130	135	100	132
Sumatra Cultuur Maatschappij.	1	Serdang..............	4,000	1,269	......	60	74	96
Sumatra Tabak Gesellschaft "Tandjong Kassan."	1	Batoe Bahara.........	3,000	1,583	89	65	53	52
Sumatra Tobacco Plantations Co. (Limited).	1	Serdang..............	2,500	1,071	......	87	69	73
Tabak Maatschappij "Arendsburg."	5	Deli.................	14,500	10,269	174	147	84	113
Tabak Maatschappij "Franco Deli."	3	Deli.................	5,208	4,852	138	114	74	80
Tabak Maatschappij "Tjinta Radja."	1	Langkat..............	3,000	2,753	205	125	103	123
United Langkat Plantations Co. (Limited).	3	Langkat..............	9,000	6,711	161	172	114	155
Average for incorporated companies.	....	....	....	160,207	145	121	92	116
Private plantations........	....	....	....	30,978	140	110	78	85
General average.....	....	....	....	191,185	144	119	90	111